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# Lighting Tailored Method

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California Energy Efficiency Standards 2005





# Background

- Part of the Standard since 1985
- Permits “Tailoring” lighting power density values using IESNA Illuminance Categories
- Generally acknowledged as critically beneficial for permitting adequate illumination power for demanding visual task environments
- To prevent “gaming” the current standard contains many specific rules
- Simplification of the tailored method was suggested by several comments during early phases of the 2005 Standards process



# Proposal for Revision (Early 2002)

- Simplification of Tailored Method
  - Revises Tailored Method to be consistent with IESNA Ninth Edition Handbook
  - Keeps TM for unusual buildings and conditions
  - Provides a table to simplify retail compliance



# Theory of Proposed Standard

- Assumes a general ambient light level plus specific power allowances for displays and ornamental lighting
- $LPD_{Total} = LPD_{General} + LPD_{walldisplay} + LPD_{feature display} + LPD_{chandelier} + LPD_{very valuable displays}$



# Use it or lose it power allowances

- The general lighting allowance is not “use it or lose it” and can be traded off with other spaces.
- All other allowances ARE “use it or lose it allowances” and can NOT be traded off
  - Wall display
  - Feature display
  - Valuable display
  - Ornamental lighting



# Comparing the Existing Standard to the Proposed New Standard

- The Proposed Standard is conceptually similar to the current Standard
  - Similar base allowance
  - Similar use it or lose it allowances
  - Similar rules and restrictions
- The Proposed Standard Simplifies in several ways:
  - Uses Table 1-N values for base allowances
  - Eliminates different wall lighting allowances
  - Simplifies display power calculations
  - Changes Table 1-P to make it clearer



# Revising the Wall Lighting Allowances

New means of setting values includes:

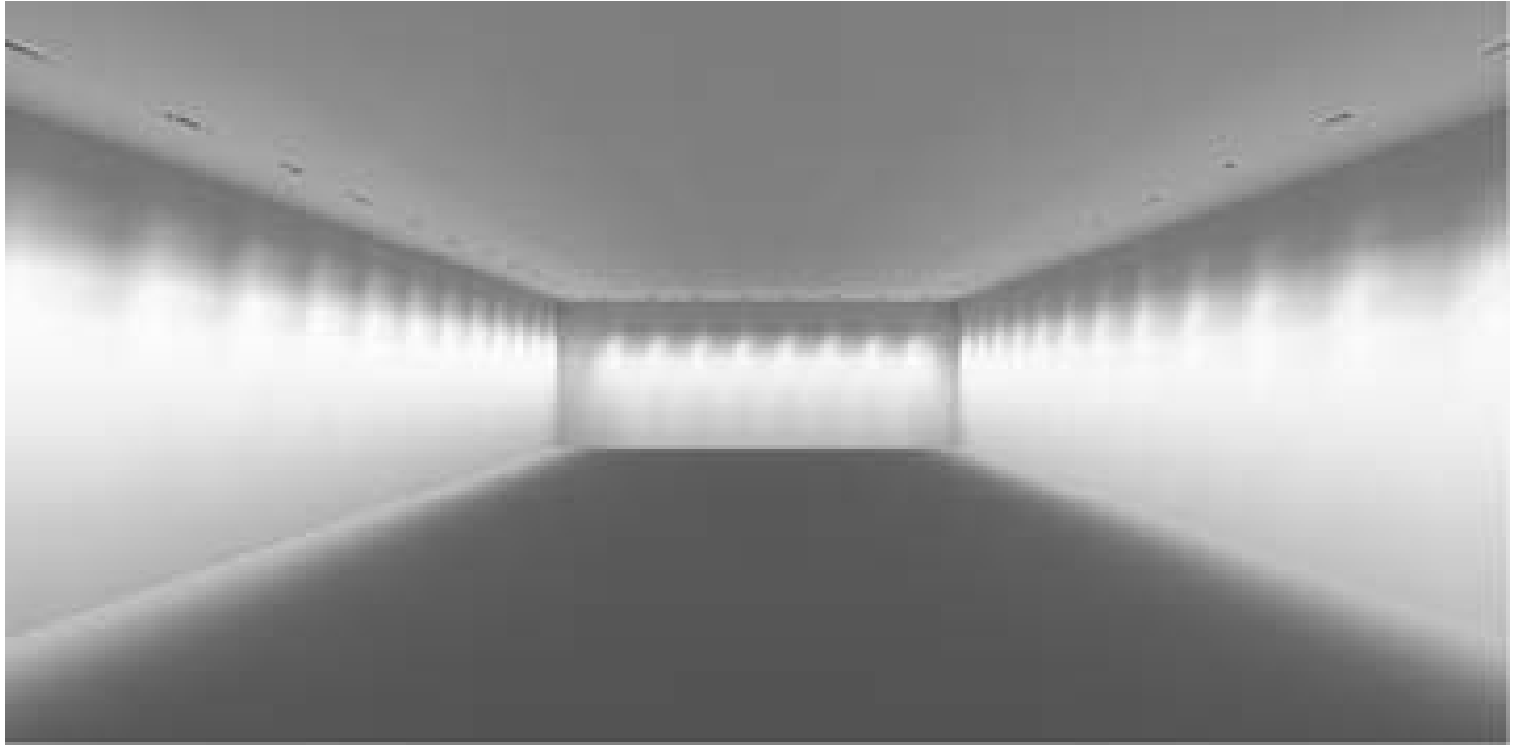
- Vertical surface Illumination Component
- Valance (brightness compensating) component

Based on modern retail lighting techniques and recently completed projects.



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# Vertical Illumination



Modeling in Lumen Micro: uniform wash of 50 fc vertical using 60 watt halogen IR lamps is the basis requires 20 watts per lineal foot of perimeter

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# Valance



- Based on two levels of valance

- Using T5 technology requires 15 watts per LF of perimeter

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# Determination of Specific Allowances

Application	Area of Wall	Allowed Power Density, W/ft
Retail	70%	22
Bank, Financial	10%	3.1
Civic Facilities	10%	3.1
Classrooms, Convention Centers	20%	6.2
Dining Rooms	20%	6.2
Gallery, Museum	70%	22
Grocery Store	40%	12.4
Hotel spaces	10%	3.1
Lobbies	20%	6.2
Lounge, recreation	20%	6.2
Mall	10%	3.1
Church	20%	6.2
Transportation Facilities	10%	3.1
Theater	20%	6.2



# Floor Display Lighting Allowance

- Permits 50 vertical footcandles on four sides of a freestanding object
- Using halogen IR lamp technology



Lumen Micro modeling of two sided and four sided objects

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# Allowances



- Absolute maximum theoretical density of floor displays = 28%
- Current standard is based on 10% density of floor displays
- Lumen Micro modeling demonstrates 5.0 w/sf to display objects at 28% density
- Value used =  $5.0 \text{ w/sf} \times 10/28 = 1.8 \text{ w/sf}$
- Reduced densities for non retail occupancies

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# New Table 1-P

1 Primary Function	2 Allowed Wall Display Power (W/ft)	3 Allowed Feature Display Power (W/ft <sup>2</sup> )	4 Allowed Ornamental Lighting (Y or N)	5 Allowed Very Valuable Display Power (W/sf) of Display Case
Auditorium	-	-	N	-
Auto repair	-	-	N	-
Bank/financial institution	3.5	.5	Y	-
Civic facilities	3.5	.5	Y	-
Classrooms, lecture, training, vocational room	7	-	N	-
Commercial and industrial storage	-	-	N	-
Convention, conference, multipurpose and meeting centers	7	.5	Y	
Corridors, restrooms, stairs and support areas	-	-	N	-
Dining	7	.5	Y	-
Electrical, mechanical rooms	-	-	N	-
Exercise center, gymnasium	-	-	N	-
Exhibit, museum	24.5	2.0	N	20



# Revised Values for Category F and G

*Table 1 –Assumptions and Calculations for Illuminance Categories F and G*

	RCR = 2.0	RCR = 5.0	RCR = 8.0
CU	.61	.42	.31
Efficacy	75 MLPW	75 MLPW	75 MLWP
LPD for F (100 fc)	2.7	4.0	5.4
LPD for G (300 fc)	8.1	12.0	16.2

- These are used instead of current standard table for small objects or long “throw”



# Maintained Ceiling Height Correction Factors

*Table 1-R Adjustments for Throw Distance (Mounting Height above Floor)*

Height in feet above finished floor of luminaire(s)	Multiply by
12 or less	1.0
13	1.05
14	1.10
15	1.15
16	1.21
17	1.47
18	1.65
19	1.84
20 or more	2.04

- This is a different way of providing for mounting height inefficiency.



# Revised Table 1-S

- Updated with modern sources
- Matches IESNA Handbook Ninth Edition

Task	Description	RCR<3.0	3.0<RCR<7.0	RCR>7.0
A	Public spaces	0.2	.03	0.4
B	Simple orientation for short visits	0.4	0.5	0.7
C	Working spaces where simple visual tasks are performed	0.6	0.7	1.1
D	Performance of visual tasks of high contrast and large size	1.2	1.3	1.5
E	Performance of visual tasks of high contrast and small size, or of low contrast and large size	1.8	2.3	3.0
F	Performance of visual tasks of low contrast and small size	2.7	4.0	5.4
G	Visual tasks at or near threshold	8.1	12.0	16.2





# Team Conclusions

- Updates LPD values based on current technology
- Embraces halogen IR technology for display in consideration of real life cycle of retail stores
- Simplifies wall lighting power allowance
- Reduces compliance paperwork submittals
- Provides the same net power allowance as current standard
- Updates to match latest IESNA recommendations and Handbook